1310.34 Database Management Systems (DBMS)
Issued: October 5, 2001

SUBJECT: Database Management Systems (DBMS)

APPLICATION: Executive Branch Departments and Sub-units

PURPOSE: The intent of this policy is to establish a framework to assist in the procurement and utilization of database management systems (DBMS) within and for the State of Michigan.

This standard is intended to establish thresholds and interoperability requirements for the creation of databases so that stored data and information can be successfully and easily transferred across the variety of hardware platforms and between different software packages. A subset of products has been evaluated and a list of certified and/or supported products will be provided as noted in threshold section.

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SUMMARY: The DBMS Standard is intended to establish requirements on the storage of information on a stand-alone PC, in keeping with its flexible, single user focus. In the server arena, the standard calls for a relational database product that supports ANSI SQL access. In the mainframe arena, the standard supports legacy systems. This standard also reflects the State's Information Architecture Principles of interoperability and distributed computing capability.

A DBMS is software to manage a database that provides a common and controlled approach maintaining data integrity and accessibility in storing data, adding new data and in modifying and retrieving existing data within a database. Security and backups are key components.

A DBMS is a computerized record-keeping system that stores, maintains and provides access to information. A database system involves four major components:
➢ Data
➢ Hardware
➢ Software
➢ Users

DBMS are used by any reasonably self-contained commercial, scientific, technical or other organization from a single individual to the enterprise and a DBMS may be used for many reasons.

DBMS are available on any machine, from small micros to large mainframes, and can be single or multi-user - obviously, there will be special problems in multi-user environments in order to make other users invisible, but these problems are internal to DBMS.

Data may be shared over many databases, giving a distributed DBMS, though quite often it is centralized and stored in just one database on one machine. In general, the data in the database, at least in a large system, will be both integrated and shared.

THRESHOLDS:

DBMS standards are necessary to provide a consistent growth direction for state government as new applications are developed and to assist agencies who are planning to change existing applications. Standards for database management systems will also provide a common access through which agencies will be able to share information.

Although a single DBMS product might be the ideal, the reality is that agencies of state government have unique information management needs. The application requirements, technical and economic environments of each operating unit (OU) will have a strong influence upon DBMS choices. While it is inconceivable to suggest that once these standards are adopted all non-conformant databases will be replaced, it is realistic to expect agencies to reevaluate their position and formulate a strategy for the future. The standards do not compel agencies to immediately change existing applications and systems; however, all new applications of a DMBS will need to give the highest consideration toward fulfilling the standard.

For Desktop Data:

Personal database environments are typically single user applications using a non-server PC workstation, a PC operating systems and a personal database management system. Applications being built using Microsoft Access do not adhere to the client/server architecture (except Personal Oracle). There is no active database server component that is separate from the application component.

Thresholds	Assumptions	Functional Specifications	Things to Consider
Minimum Systems Requirements: **Hardware:** Pentium III PC with 366+ MHZ 500 MB of diskspace 128 RAM **Operating System:** Window 95B, Windows 98 2nd edition, Windows 2000 or Windows NT 4.0 or later	Single User Application intended for 1 site license Database storage system Table size < 1 million records In terms of performance of application - maximum users 25-50 Application resides on desktop	Recoverability Cost Security Scalability Interoperability Connectivity Backup Reorganization	Compatibility of product Ownership of data Maximum record size Number of users Transaction volume Scope of project - machine only, enterprise etc.

Product Recommendation	Strengths
Microsoft Access	Ease of use Compatible with other products Interface easier Database training easier and more readily available Wizards to assist in the learning and development process Linking and conversion of data allows data to be importable Spreadsheets can interact with Access Connectivity between suites Web enabled Application development macros Mobility - all information in 1 file (self contained) Enhanced search capabilities Filters Potential to limit views of users with wizards Availability of upgrades Superior help menus Samples from web and those provided with software are very good Portable into other applications such as PowerBuilder

(See DBMS desktop product comparisons document)

For Server Data:

The Server is a relatively large computer in a central location that manages a resource used by many people. When individuals need to use the resource, they connect over the network from their computers, or clients, to the server.

Reasons for moving from the Desktop Data to the Server Data:

1) Desktop data can no longer be managed in a relatively easy fashion and/or
2) Performance degrades to a point where response times become unacceptable.

Functional Specifications	Assumptions	Things to Consider
Recoverable - roll back/roll forward, point in time, logic mirroring	Capable of working with several clients at the same time.	When selecting a product that interfaces with certain databases be sure that your OU supports that database.
Mirroring - hardware and logical	Database administration tools are on server	Why do I need the application?
Security - encryption, C2 compliant, password protected, expiration, logging of users, privacy, integrity, and confidentiality	Roles, profiles, and administration do security	What platforms does your OU support?
	Connectivity - TCP/IP	What development tools are you using and what platform do they support?
	Some applications are accessed over the Internet	How robust is the application that you are developing?
Scalability - growth potential, customer service center, Web enabled, merges with higher MHZ	Designed for connection to one or more networks	Does your OU have enough staff with the knowledge, skills, and abilities to support your selection?
Locking - page-level, row-level	Large memory capacity Large disk storage capacity Capable of adding more than one CPU to divide processing tasks	Consider if the transactions are on-line or batch
Programmability - Triggers & Procedures - controls at the server level using business rules.	The data is more highly organized. No duplicate pieces of data that the user or application has to update at the same time.	Determine the transaction volume Cost of product One vendor support Determine what is on contract as we develop standards
Open Platform - Supports Unix, NT, Windows 2000	Related pieces of data are grouped together in a single structure or record, and relationships can be defined between these structures and records.	
Interoperability - plug & play add-ons, Middleware		
Connectivity - transparent to users, from outside sources, different boxes	The relationships between data in the database are maintained.	
Portability - take my server and move to NT platform	The data is stored correctly, and that the rules defining data relationships are not violated.	
Web tools - applications are web enabled	All data is recoverable to a point of known consistency in case of system failures.	
Backup - ease of use, on-line		

versus off-line, speed <u>Reorganization</u> - speed, ease of use <u>Reliability & Performance</u> - 24 x 7	Capable of performing backups without disrupting work.	

Products	Strengths	Weaknesses	Opportunities	Threats
Oracle	Scalability State Defacto Database. NIKU Project Management Repository. Market Share	Cost Complex DBA Administration	Client PC Product COTS Products Enterprise Focus	Proprietary Environment
Sybase	Cost Faster to production	Functionality large scale	OU Focus	Market Share COTS* Products
SQL Server	Cost	Functionality Non-Unix	MS Focus OU Focus	Scalability MS Only Functionality

*Commercial Off the Shelf Software

For Mainframe Data:

Mainframe – Multi-user, multiple-database environment, for transaction-based application systems requiring <u>high</u> availability, capacity, performance, and transaction throughput.

Mainframe Enterprise Databases Must Contain	Assumptions	Things to Consider

Centralized Mgmt:
  - Operations
  - Security
  - Tape Mgmt
  - DB Mgmt Tools/Utilities
Limited staff requirements
Legacy System Support
Performance:
  - High volume
  - High speed
  - High # of Users
  - High Throughput
High-end Scalability
Multiple DB Instances and Apps co-exist
Superior Backup/Recovery
Advanced Security
Established Utilities
Version Control
Low Total Cost of Ownership (Product / License / Maintenance)
High Availability
Integrated Mgmt Tools
Integrated User Tools
Strong Vendor Support
Proven Vendor Reliability
	Multi-user , Multi-OU Accessibility
	
	24x7 Availability
	
	Proven Technology / Software
	
	Reliability
	
	WEB-enabled
	
	Ease-of-Use for (DB Mgmt) Tools
		Transaction volume; cost / transaction
		
		Enterprise (SOM) Integration – need to work with other systems?
		
		Skills / Training Availability – are skilled staff available?
		
		What type of processing is required (query, or batch/online transaction)?
		
		Is the vendor reliable? Provide technical support? Be here next year?
		
		Are there requirements for high security?
		
		Data integrity controls? Is centralized Operations/Technical supporting a requirement?
		
		Will the DBMS need to be accessed from the Web? Tools Available?
		
		Parallel Processing

Product Recommendations

Platform	Database
Bull	IDSII
IBM	DB2
NCR	Teradata
Unisys A-Series	DMSII

(See DBMS Mainframe & Teradata SWOT documents)

APPLICABLE FORMS: None.

PROCEDURES:

General Information:

Operating
Unit (OU):   The goal of this policy is to give IT project managers guidance and better tools for
                ensuring the efficient use of resources and successful implementation of database
                management. The focus is two fold: 1) to give OU management and technical personnel
                a road map for selecting and implementing databases; and 2) to assure that the proper
                tools are utilized in the development of new databases.

                This standard forms the core of the State's policy for management of information
                technology projects. An OU must migrate to this standard if their cause to change from
                their existing product.

Maintenance:

DMB: Acquisition Services shall not approve any acquisition or purchase request without
                confirmation from the Department of Information Technology, Bureau of Strategic Policy
                that such request is in compliance with the standard.

Operating
Unit(OU):   Any and all projects, consulting requests, equipment and software acquisition requests,
                or ITB's relating to Database Management Systems (DBMS) will be subject to review for
                compliance with this standard.

DIT: The Enterprise Standards Review Team (ESRT) will review this standard on a continuing
                basis and make recommendations to the State Chief Information Officer. An appropriate
                group of staff, representing a wide-range of State Operational Units, will review and
                possibly revise these standards and guidelines as often as needed.

                Exceptions from this standard for reasons other than those outlined above will be made
                through the exception handling process described in the Exception Process Template.

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